

SYSTEM CONTROLLER



**IEEE Standard 488-1978
Compatible**

**Utilizes Tektronix Standard
Codes and Formats**

**Optimized for Instrumentation
Control**

**Modular Design: Rackmount or
Portable**

**Efficient, Easy-to-Use BASIC
Language with Extensions**

**Second pair of RS-232 and IEEE-
488 Ports Optionally Available**

**External Floppy and Hard Disk
Optionally Supported**

**Memory Expandable to
512 kbytes**

The 4041 System Controller is a powerful, flexible, expandable IEEE Standard 488 controller designed to work with Tektronix and other vendor's IEEE Standard 488 instruments.

While the basic unit is intended principally for low user-skill environments such as production line testing, various options and peripherals to equip the 4041 for full interactive flexibility in research lab and engineering applications are available. Tektronix full line of terminals are fully compatible to create an optimum programmer interface in the more sophisticated areas. BASIC language features support the range from the occasional programmer to the sophisticated programming team tackling complex products. The compact size of the 4041, TM 5000 IEEE Standard 488 instrumentation, permits configuration of very compact systems which can go into applications impractical for earlier generations of systems.

Operator Skill Spectrum

In test and measurement systems applications, the programming skills of the operator range from moderately high to low. On a production test station, operator computer skills are usually lower. The 4041 System Controller was designed, with options and peripherals, to fit these differing needs. The standard 4041 is an "execute only" controller; it can only run previously developed programs. The operator cannot tamper with programs, or even list them. The standard 4041 is nonintimidating, with operator interaction limited to reading prompts from the alphanumeric display, inserting a DC 100 tape cassette, and pressing a small number of keys.

Tektronix®
COMMITTED TO EXCELLENCE

Print outs (perhaps for applications such as failure tags to be attached to a defective unit under test) can be automatically generated on the built-in printer. Up to four interface ports, two IEEE Standard 488 and two RS-232, permit networking to host computers of up to 28 IEEE Standard 488 instruments, or even segregation of fast and slow instruments onto two buses to maximize throughput.

At the sophisticated end of the operator spectrum, an RS-232 CRT terminal attached to a 4041 with program development ROM's (Option 30) provides a flexible interactive workstation for the sophisticated programmer. Peripherals such as printers, plotters, and mass storage add further power. This configuration would be typical in research labs, or for the test engineer to develop programs which will then be run by operators on the production line with execute-only 4041s.

Programmer Skill Spectrum

Most test programs are written by "electronics types," not computer science majors. Many test engineers write programs only occasionally; later modifications and maintenance are frequently done by a second party since "the guy who wrote the program doesn't work here anymore."

At the other end of the spectrum, however, are complex requirements demanding a team approach to writing the program, and sophisticated and powerful techniques to maximize memory utilization and minimize run time.

BASIC is an excellent language for the occasional programmer, and was chosen for the 4041. Its English-like commands, simple syntax, and line-by-line interpreter implementation combine for friendly, easy use. To improve the self-documenting characteristics and thus reduce maintenance costs, 4041 BASIC is enhanced by several features. Variable names may be up to eight characters, allowing the programmer to select meaningful names like RISE-TIME, VOLTAGE 1, or DELAY. Subprograms and program lines may be named, with examples such as SRQHNDL or CALCRMS. At the end of each program line comments may be attached to explain the purpose of the statement. This aids in program documentation.

Simple BASIC leaves much to be desired for most sophisticated programmers. 4041 BASIC includes many enhancements such as FORTRAN-like subprograms. Variable passing from main to subprograms and the ability to declare any variable as local or global means that a team of programmers can work quite independently on a large task, with the main program ultimately being not much more than a series of subprogram CALL statements. Other powerful features include optional data types (short and long floating point plus integer), a very efficient ERROR trapping and handling system, a proceed mode which overlaps I/O and processing operations for maximum system speed, logical unit assignment capability, and up to 512 kbytes of memory directly addressable without overlays or paging techniques. Powerful device drivers (stream specifications) provide high level programming support for all IEEE Standard 488 and RS-232 ports, front panel control, mass storage and terminal console requirements. All default parameters assigned to these drivers are programmable and can be changed, allowing for optimum configurability to your exact system need.

4041 Architecture

The 4041's main CPU is the powerful 16-bit MC68000. Standard memory is 32 kbytes (approximately 19 k user-available), with optional memory expansion to 160 k, 256 k and 512 kbytes memory total addressable. A 20-character alphanumeric LED display, 20-character thermal printer, DC 100 cassette drive, 18-system/function keypad, and IEEE Standard 488 interface, and an RS-232 interface are standard. A real-time clock and calendar capability are standard on the 4041. Option 01 adds a second pair of interfaces (one IEEE Standard 488 and one RS-232). The Option 01 IEEE Standard 488 interface has Direct Memory Access capability. Other options include an 8-bit parallel TTL interface (Option 02); SCSI (Small Computer System Interface, Option 03, for external disk mass storage and a second RS-232 port) to support interfacing to floppy and hard disks for greater file and data storage; program development ROMs and carrier (Option 30); and a program

development/debug keyboard (Option 31). Options 30 and 31 could thus let a test engineer easily and temporarily convert an installed execute-only 4041 into a debug/edit mode, make necessary program changes, and restore it to the tamper-proof condition. Extensive program development, however, would normally be accomplished at a programming station consisting of a 4041 with an Option 30 plus a CRT terminal to permit multiline viewing of program listings. The Tektronix 4105 Color Graphics Terminal makes a ideal console device for the 4041. The 4041 package is a compact monolithic unit of identical height and width to the TM 5003 Power Module. A 4041 and TM 5003 can be easily fastened together and used on the bench or rack-mounted as a single unit, leading to extremely compact system configurations suitable for crowded benches and racks or use in vans, ships and aircraft.

Test and Measurement Orientation

The 4041 System Controller was developed simultaneously with the TM 5000 instrument family, and optimized as an instrument controller. In its power-up default condition, the 4041 implements Tektronix *Standard Codes and Formats* and thus can communicate instantly with Tektronix IEEE Standard 488 instruments without any programmer attention to formats, syntax, delimiters, number format, etc. However, the 4041 also has virtually complete, programmable control over every IEEE Standard 488 legal bus condition. When this ability is combined with the 4041's Logical Unit assignment and stream specification ability, virtually any IEEE Standard 488 instrument or device can be easily handled. The stream specification ability means that a particular device's format, syntax, end-of-message character, and other idiosyncrasies can be described one time in a Logical Unit assignment statement. Thereafter, the programmer can control or obtain data from that instrument as easily as from an instrument which fully complies with Tektronix *Standard Codes and Formats*.

The error trapping and handling capabilities of the 4041 are of particular importance in test and measurement systems. Virtually any category of error—on the bus or even within the 4041—can be trapped and handled by user specified software drivers. When coupled to the powerful self-diagnostics and error-reporting features of TM 5000 instruments, very fault-tolerant systems can be configured which demand little or no operator skill. Extensive error handling and trapping capabilities can keep the system from "crashing" in almost all situations.

SPECIFICATIONS

System Keys

AUTO-LOAD

Causes the internal magnetic tape to rewind and find the "AUTOLD" program. This program is then loaded into memory and execution begins.

ABORT

Halts program execution if no user-specified handler routine is called by the program. If a handler routine is specified for the ABORT key, program control is passed to that routine.

PROCEED

Performs one of the following functions depending on equipment or program state:

1. Causes program execution to start at the next program line if a Pause was encountered.
2. Resumes execution after an ABORT. If a program is loaded from the tape, execution starts from the first program line.
3. Delimits user input when requested from an INPUT statement.

CLEAR

Clears the alphanumeric display. Does not clear user-defined prompts or the input cursor from an INPUT statement.

EEX

Causes the number requested by an Input statement to be entered in scientific notation. Numbers entered after pressing the EEX (Enter Exponent) key are considered part of the exponent.

PAUSE

Halts the program after executing the current line. If the current program line is an INPUT statement, the program stops before the execution of INPUT.

User-Definable Function Keys

Numeric user-definable function keys, 0-9, can be assigned subroutines by the applications program. The keys may be redefined by the program during execution to allow for unlimited user routines. The function keys can be enabled or disabled under the control of a program.

Numeric values are assigned to these keys for entering information requested by an INPUT statement. When input has been completed, user functions assigned to these keys are re-enabled.

The other two keys on the front-panel keyboard are the decimal key (".") and the minus ("—") key. The decimal key is provided for decimal point entry associated with numeric and the minus key is used to enter negative numbers associated with numeric.

Keyboard overlays may be used for labeling the function keys with a number or an abbreviation of the user routines.

Front-Panel Display

The front-panel display communicates test procedures and operator prompts and displays intermediate or final program results. The display is fully programmable.

Alphanumeric Display

Twenty-character alphanumeric line.

Sixteen-segment LED.

Size — Height: 3.8 mm (0.15 in).

Width: 2.8 mm (0.11 in).

Characters Per Cm — 1.6 characters/cm (4 characters/in).

Sixty-four character symbols.

Message Viewing Time —

Programmable.

Scrolling Rate — Programmable.

System Indicators

LEDS

Located on the display front panel indicate the status of the system.

BUSY

Indicates that a program is running. A blinking BUSY light indicates that the system has PAUSED (temporarily halted).

POWER

Indicates the machine is on.

I/O

Indicates that an Input/Output operation is being performed.

FN

Indicates that the user-definable function keys are enabled.

Magnetic Tape Drive

Magnetic tape drive is used to store user's programs and data. The tape is the primary means of loading programs, particularly for execute-only applications; in addition, the tape drive provides for long-term untended data logging.

File Structure — 48 named files (maximum).

Capacity (Physical Records) — 650 typical (600 minimum).

Physical Record — 256 bytes (typical tape capacity is 166,400 bytes).

Average Transfer Rate — 13,324 bits/s.

Search Speed — 1520 mm/s (60 in/s).

Tape Rewind — 1520 mm/s (60 in/s).

Tape Cartridge — 100A Certified Data Cartridge from Tektronix.

Disk Mass Storage — Supported externally with Option 03.

Printer

The printer produces hard copies of the intermediate or final program results, operator prompts, and changes in variables or system status. Messages longer than 20 characters are printed on succeeding lines where the user can specify the appropriate indentation for better delineation and readability.

Printing Method — Thermal, fixed head.

Capacity — 20-character alphanumeric line.

Font — 5 x 7 dot matrix printed.

Character Size — 2.5 mm high x 1.8 mm wide (0.10 in high x 0.07 in wide).

Line Spacing — 4.23 mm (6 lines/in).

Printing Speed — Two lines/s.

Feed Speed — 8.46 mm/s (0.34 in/s).

Character Set —

26 Uppercase letters

26 Lowercase letters

10 Numeric digits

34 Special characters

32 Control characters

128 Total

Paper Size — 60 mm x 25 mm (2.36 in x 82 ft).

Controlling the Bus

When using BASIC high level print and input commands, the 4041 automatically controls all bus management signals in the proper sequence for the desired interface task and instrument interaction. A bus management function program that uses direct IEEE Standard 488 mnemonic commands to accommodate differences in implementation of GPIB on other equipment. Virtually all legal bus states can be programmed this way, which affords a high degree of flexibility for addressing various system applications.

Bus Interrupts

The 4041 has the ability to detect and respond to various types of interrupt conditions that can be generated on the GPIB. User-specified software handlers can be written to perform various tasks when these conditions occur. Interrupts can be programmably ENABLED or DISABLED.

Interrupt Conditions

Mnemonic	Message
SRQ	Service Request
EOI	End or Identify
IFC	Interface Clear
DCL	Device Clear
TCT	Take Control
MTA	My Talk Address
MLA	My Listen Address

Bus Communication

Interface and bus device addressing are programmable. This allows the user to direct message and data flow to and/or from the appropriate interface and GPIB peripheral. Information such as primary and secondary addressing, along with pertinent device-dependent information, can be attached to a specific Logical Unit number. Subsequent communication with that GPIB device can be directed to the Logical Unit, eliminating the need for redundant or repetitious statement programming.

Transfer Rates (IEEE Standard 488) Rates for the Standard Interface

	Input	Output
Normal Mode	Exceeds 5 kbytes/s	Exceeds 5 kbytes/s
Fast Mode	Exceeds 16.5 kbytes/s	Exceeds 19.5 kbytes/s

Serial Interface

The 4041 comes with a standard serial asynchronous RS-232C interface. The 4041 can support applications requiring terminals, modem/host communication, or instrumentation with this interface protocol.

In addition to standard transmission rates from 75 to 9600 baud, transmission rates are programmable to any integer ranging from 2 to 9600 baud. **Full Duplex** — Full capability (half duplex not supported).

Transmit/Receive — Matched rate only.

Bits Per Character — 5, 6, 7, or 8 bits.

Stop Bits — 1 or 2.

Parity — Even, Odd, High, Low, None.

Error and Interrupts

Conditions such as parity, framing and overrun errors can all be programmably captured. User routines or handlers can then direct what action should be taken, depending on the particular condition.

The end of message delimiter (EOM) can be programmable to any one or two character ASCII string. This enables the 4041 to communicate with most hosts or peripherals via the serial interface.

Clock/Timer

One clock provides date and time of day which is programmably set. The timer clock returns the time in seconds since power up. The timer has 10 millisecond resolution.

Self-Test

An integral part of the 4041 is the self-test feature, which assures the user of reliable operation. Self-test is executed automatically on power-up and performs extensive hardware and operating system tests.

Dynamic Range

Short Floating Point —

Max: $\pm 3.40282 \text{ E} + 38$.

Min: $\pm 2.93874 \text{ E} - 39$.

Long Floating Point —

Max: $\pm 1.7976931348623 \text{ E} + 308$.

Min: $\pm 5.562684646269 \text{ E} - 309$.

Integer —

—32768 to +32767.

Character String Length (Max) — 32767.

Array Elements (Real, Integer or Character Arrays) —

32767 elements maximum per row (or column); limited by total memory installed.

Ac Power Requirements

Line Voltage —

100 V ac to 120 V ac, 200 V ac to 240 V ac $\pm 10\%$.

Line Frequency —

48 Hz to 66 Hz.

Power Consumption —

120 W (maximum).

Environmental Characteristics

Operating Temperature —

0°C to +55°C. (+32°F to +131°F) without data cartridge or printer paper.

0°C to +45°C (+32°F to +113°F) with data cartridge or printer paper.

Storage Temperature —

—40°C to +75°C (—40°F to +167°F) without data cartridge or printer paper.

Humidity —

85% relative noncondensing. 0°C to +45°C (+32°F to +113°F) —20% to 80% condensing.

Altitude —

Operating: 4600 meters (15,000 ft).

EMI —

Meets FCC Part 15, Subpart J, Class A and VDE 0871 Class B.

Physical Characteristics —

Dimensions

Width: 213 mm (8.5 in)

Height: 180 mm (7.2 in)

Depth: 520 mm (20.8 in)

Weight:

Net: 7.8 kg (17.3 lb)

Net (with options): 8.7 kg (19.3 lb)

Included Accessories —

Power cord (161-0066-00); system verification tape (062-5828-01); RS-232 male loop back connector (013-0198-00); blank DC 100 Tape Cartridge (119-1350-00); blank overlays for FP keyboard (334-4074-00); roll of printer paper (006-3557-00); Controller (GPIB) Programming Guide (070-4696-00); instruction manual.

4041 BASIC—OPTIMIZED FOR SYSTEM OPERATION.

Like standard BASIC, 4041 BASIC is easy to learn and understand. The programmer works with natural, English-like statements and familiar mathematical notation. Program code is easy to follow, even for nonprogrammers, and documentation is complete and legible.

Program development features, including full editing, debugging, and program and file management, save programming time and result in reliable code. Sophisticated memory management techniques enable the programmer to make the best use of memory space. And once the code has been created and tested a software-controlled lockout renders the program inaccessible to outside intervention.

4041 BASIC SUMMARY

Function Commands

ABS—Returns the absolute value of a numeric expression.

ACOS—Returns the value of the arc cosine of the numeric expression, in the current trigonometric units.

AND—Returns a logical true (integer one) if both values are true, logical false (integer zero) if not.

ASC—Returns the decimal equivalent of an ASCII character.

ASIN—Returns the value of the arc sine of the numeric expression, in the current trigonometric units.

ATAN—Returns the value of the arc tangent of the numeric expression, in the current trigonometric units.

BAND—Performs a Boolean and on the two operands. Each operand may have up to 32 bits.

BNOT—Performs a Boolean not on up to 32 bits.

BOR—Performs a Boolean or on two operands each of up to 32 bits.

BXOR—Performs a Boolean exclusive or on two operands of up to 32 bits each.

CHRS—Returns the ASCII equivalent of a decimal value.

COS—Returns the cosine of the angle given by a numeric expression, in the current trigonometric units.

EXP—Returns e^x where X is a numeric expression.

INT—Returns the largest integer less than or equal to a numeric expression.

LEN—Returns a count of the number of characters in a string.

LGT—Returns the base-ten logarithm of a numeric expression.

LOG—Returns the natural logarithm of a numeric expression.

MAX—Returns the larger of two values.

MIN—Returns the smaller of two values.

NOT—Returns a logical true (integer one) for a logical false value, and a logical false (integer zero) for a logical true.

OR—Returns a logical true (integer one) if either value is true, a logical false (integer zero) if not.

PI—Returns pi, 3.1415926535898.

POS—Finds the first occurrence of a substring in a string and returns the character position of the first character of the match.

POSN—Returns the position of the first character of the nth occurrence of a substring.

REPS—Inserts a substring into a string at a specified point, deleting characters from the original string.

RND—Returns a pseudorandom number between 0 and 1.

ROUND—Returns the integer nearest in value to a numeric expression.

SEGS—Extracts a substring from the main body of a string, starting at a specified character position.

SGN—Returns +1 if the numeric expression is greater than 0, 0 if the numeric expression is 0, or -1 if the numeric expression is less than 0.

SIN—Returns the sine of the angle given by a numeric expression in the current trigonometric units.

SQR—Returns the square root of a numeric expression.

STR\$—Converts a number into a string.

TAN—Returns the tangent of the angle given by a numeric expression in the current trigonometric units.

TRIM\$—Removes leading and trailing spaces from a string.

VAL—Converts digits entered as part of a string into numbers usable for computation.

VALC—Converts digits entered as part of a string into numbers usable for computation.

XOR—Returns a logical true (integer one) if either value is logical true, a logical false (integer zero) if both are logical true, or both are logical false.

Storage Management Commands

COMPRESS—Compresses blocks of unused memory into one block.

DATA—Stores data items within the program.

DELETE ALL—Deletes all program lines and variables from memory.

DELETE VAR—Releases storage allocated for specified variables.

DIM—Declares a variable to be an array and allocates storage for it.

INTEGER—Declares a variable to be of integer type and reserves storage for it.

LONG—Declares a variable to be of 8-byte floating point type and reserves storage for it.

READ—Reads values into memory from DATA statements.

LET—Assigns value to variables during program execution.

RESTORE—Sets the data pointer to the first item in the first or a specified DATA statement.

Control Commands

CALL—Transfers control to a user-defined subprogram.

END—Ends program execution; during program development, marks the end of a program segment.

EXIT—Cleans up the 4041's run-time stack when exiting prematurely from a FOR...NEXT loop.

FOR...NEXT—Controls looping, the number of times a section of program is executed.

GO SUB—Transfers control to a specified target line and returns to the line following when a RETURN statement is encountered.

GO TO—Transfers control unconditionally to a specified target line.

IF...THEN...ELSE—Provides for setting conditions and alternate consequences.

RETURN—Specifies that the next statement to be executed is the one following the last GO SUB, CALL, or function invocation.

STOP—Stops program execution.

Program Development Commands and Keys

ABORT—Halts execution of the current program and generates an interrupt.

AUTOLOAD—Loads and runs a file named AUTOLD from the current DC-100 tape.

AUTONUM—Activates and deactivates the 4041's automatic numbering feature.

BREAK—Halts execution of a running program.

CLEAR—Clears the Display.

CONTINUE—Restarts execution of a PAUSED program from the point at which it stopped.

DELETE—Deletes a specified line.

DELETE<—Deletes the character to the left of the cursor.

DELETE>—In INSERT mode, deletes the character to the right of the cursor.

CURSOR<—Moves the display cursor left.

CURSOR>—Moves the display cursor right.

INSERT—Toggles between INSERT and REPLACE mode.

LIST—Prints the current program on the thermal printer.

PAUSE—Halts execution of a running program.

RECALL—Displays the line most recently entered, edited, or executed.

RECALL NEXT—Displays the line following the line most recently recalled.

RECALL PREV—Displays the line preceding the last line recalled.

RUN—Executes the program starting at the first line or a specified line, with breakpoints disabled.

SCROLL<—Moves the display one space to the left.

SCROLL>—Moves the display one space to the right.

SHIFT—Determines whether alphabetic characters are interpreted as upper or lower case.

STEP—Causes the next line of a PAUSED program to be executed.

Program Development Commands

BREAK—Sets or lists breakpoints at specified line numbers for debugging.

CONNECT—Sets up trace flags within subprograms.

DEBUG—Executes a program with breakpoints and trace flags enabled.

NOBREAK—Clears some or all of the breakpoints set by the BREAK command.

NOTRACE—Clears some or all of the flags set by the TRACE command.

REM—Allows programmers to add comments to the current program.

RENUMBER—Renumbers program lines.

TRACE—Sets flags used during debugging.

TRACE FLOW—Displays originating and destination line numbers when a branch statement is executed.

TRACE PROGRAM—Displays each line number after the line is executed.

TRACE SUB—Specifies subprograms for which TRACE information is to be displayed.

TRACE SUB ALL—Traces information throughout the execution of a subprogram or user-defined function.

TRACE VAR—Specifies variables for which TRACE information is to be displayed.

TRACE VAR ALL—Displays trace information for all variables in the current environment.

TRACE VIEW—Displays currently enabled trace information.

Input/Output Commands

CLOSE—Returns a specified logical unit number to its default stream spec.

CLOSE ALL—Closes all open logical units.

COPY—Copies data from one device or file to another.

GETMEM—Transfers data from a buffer string into string variables or numeric variables in memory.

IMAGE—Specifies the format for USING clauses with PRINT and INPUT statements.

INPUT—Transfers data from a specified peripheral device into variables in memory.

OPEN—Associates a logical unit number with a device description for I/O operations.

PRINT—Transfers data from variables in memory to a specified peripheral device.

PUTMEM—Transfers numeric or string data into a string variable.

RBYTE—Transfers 8-bit bytes from a specified peripheral device into memory.

SELECT—Selects a default device description for primitive I/O operations.

WBYTE—Transfers 8-bit bytes from memory to a specified peripheral device.

GPIO Functions

ATN—Asserts ATN line; sends universal and addressed commands from the controller, and designates peripherals as talkers and listeners for data transfers.

DCL—Sends DCL (Device Clear) command, returns all devices on the bus to their device-dependent quiescent state.

EOI—Asserts EOI line; indicates the end of a data transfer sequence from a talker.

GET—Sends GET (Group Execute Trigger) command to selected devices.

GTL—Sends GTL (Go To Local) command to selected device.

LLO—Sends universal command Local Lock Out (LLO).

IFC—Asserts IFC line for a specified amount of time.

MLA—Returns the 4041's primary listen address.

MTA—Returns the 4041's primary talk address.

POLL—Executes a serial poll on the GPIB.

PPC—Configures the bus for a parallel poll.

PPU—Unconfigures the bus from a parallel poll.

REN—Controls REN line.

SDC—Sends SDC (Selected Device Clear) to selected device.

SPD—Returns all devices from the serial poll enable state.

SPE—Puts all devices in Serial Poll Enable state.

SRQ—Requests service from the controller.

TCT—Sends TCT (Take Control) to another device.

UNL—Returns the UNLISTEN command value.

UNT—Returns the UNTALK command value.

Program Management Commands

- APPEND**—Loads a program or program segment from a specified file and adds it to the program already in memory, at a specified point.
- DELETE LINE**—Deletes a specified line, or group of lines from memory.
- LOAD**—Clears memory and loads a program from a specified device.
- SAVE**—Transfers a copy of the current program to a specified output device, under a specified filename.

File Management Commands

- DELETE FILE**—Deletes files from directory-oriented, file-structured devices.
- DIR**—Prints a directory from one specified device to another.
- DISMOUNT**—Closes open DC-100 tape files, rewinds the tape, and updates the tape directory if necessary.
- EOF**—Returns a value of 1 if an end-of-file condition is met on a specified logical unit, and returns 0 if not.
- FORMAT**—Prepares a DC-100 tape for use.
- RENAME**—Allows a file on the DC-100 tape to be renamed.
- TYPE**—Returns an integer from 0 through 4 indicating the type of data stored as the next data item in a file.

Environmental Control Commands

- ASK ("ANGLE")**—Returns a numeric value indicating the current coordinate system for trigonometric functions.
- ASK ("AUTOLOAD")**—Returns a numeric value indicating whether the AUTOLOAD key is enabled.
- ASK ("CHPOS")**—Returns the position of the last character in a string scanned by a VAL or VALC function.
- ASK ("IODONE")**—Indicates whether proceed-mode I/O operations are complete on a specified logical unit.
- ASK ("KEY")**—Returns the number of the next function key waiting for service.
- ASK ("MEMORY")**—Returns the size in bytes of the largest free block in memory.
- ASK ("MEMORY",ALL)**—Returns the amount in bytes of all free space in memory.
- ASK ("SEGMENT")**—Returns a code giving information about the program segment currently executing.
- ASK ("SPACE")**—Returns an estimate of the amount of memory, in bytes, required to save the current program in ASCII.

ASK ("TIME")—Returns the time in seconds since power up.

ASK ("UPCASE")—Returns a numeric value indicating whether the UPCASE parameter has been set.

ASK\$ ("DRIVER")—Returns information about all device drivers.

ASK\$ ("TIME")—Returns a string with the current date and time.

ASK\$ ("ERROR")—Returns a string containing information about an error currently being handled.

ASK\$ ("ID")—Returns a string containing the 4041's ID information.

ASK\$ ("LU")—Returns a string containing the expanded stream specification for a specified logical unit number.

ASK\$ ("PATH")—Returns a string containing the active call sequence.

ASK\$ ("ROMPACK")—Returns a string containing the names of all ROM-packs attached to the system.

ASK\$ ("SELECT")—Returns a string containing the currently selected stream spec.

ASK\$ ("SELFTEST")—Returns a string containing the result of the last self-test.

ASK\$ ("VAR")—Returns a string containing information about a specified variable.

ASK\$ ("VOLUME")—Returns the volume ID of a specified device.

INIT—Initializes variables and system environmental parameters.

INIT ALL—Performs both an INIT and an INIT VAR.

INIT SELFTEST—Reperforms the self-test performed on power-up.

INIT VAR—Sets numeric variables to 0 and string variables to null.

SET ANGLE—Selects a coordinate system for trigonometric functions.

SET AUTOLOAD—Enables or disables the AUTOLOAD keys.

SET FUZZ—Sets the number of digits to be compared and the number to be considered equal to zero for comparisons of short and long floating point numbers.

SET PROCEED—Enables or disables the 4041's proceed-mode I/O feature

SET TIME—Sets the date and time parameter.

SET UPCASE—Determines whether upper case letters are considered the same as lower case letters for string comparisons.

Interrupt and Error Commands

ADVANCE—Resumes execution with next line after handling an error.

BRANCH—Resumes execution at a specified line.

DISABLE—Deactivates a condition handler.

ENABLE—Activates a condition handler.

OFF—Deletes the "linkage" between an interrupt condition and a section of program written to handle that condition.

ON—Sets up "linkage" between an interrupt condition and a section of program to handle that condition. The conditions are function keys, I/O complete in proceed mode, errors, the abort key and SRQ, MTA, MLA, EOI, TCT, DCL and IFC from the GPIB.

POLL—Serially polls each device on the POLL list or the GPIB to determine which device is requesting service.

RETRY—Resumes program execution after handling an error with the line generating the error.

MONITOR—Transfers control to the system handler after executing a user-defined error handler or ABORT handler.

WAIT—Halts program execution for a specified number of seconds.

Subprogram and User-Defined Commands

FUNCTION—Marks the beginning of a user-defined function.

SUB—Marks the beginning of a subprogram.

ORDERING INFORMATION

4041 System Controller

Option 01 — Second GPIB and RS-232C Ports

Option 02 — TTL (8 Bit) Parallel Interface

Option 03 — Disk Interface and RS-232C Port

Option 23 — Added Memory
160 Kbyte Total

Option 24 — Added Memory
256 Kbyte Total

Option 25 — Added Memory
512 Kbyte Total

Option 30 — Program Development ROMs and ROM Carrier

Option 31 — Program Development Keyboard

Rackmountable Kit

Cabinet-to-Rackmount Conversion Kit — Equipped with slide-out assembly to rackmount a 4041 System Controller to the left of a TM 5003.
Order 040-0984-00

ROM Packs

4041R01 — Graphics ROM Pack

4041R02 — Plotting ROM Pack

4041R03 — Signal Processing ROM Pack

4041R04 — Utility ROM Pack

International Power Cord And Plug Options

Option A1 — Universal Euro
220 V/16 A, 50 Hz

Option A2 — UK 240 V/13 A, 50 Hz

Option A3 — Australian 240 V/10 A, 50 Hz

Option A4 — North American
240 V/15 A, 60 Hz

Field Installed Modifications

4041F01 Same as Option 01

4041F02 Same as Option 02

4041F03 Same as Option 03

4041F30 Same as Option 30

4041F31 Same as Option 31

040-1141-00, Field Upgrade, Same as Option 23.

040-1142-00, Field Upgrade, Same as Option 24.

040-1143-00, Field Upgrade, Same as Option 25.

Optional Accessories

Blank ROM Carrier — 013-0215-00

NOTE: Contact your local Tektronix Sales Engineer before ordering field memory additions.

For further information, contact:

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